

# **Review of the Northeast Region Discard Estimation Methods for Groundfish Quota Monitoring and Annual Catch Limits**

## **Terms of Reference**

February 2010

1. Compare and contrast the performance with alternative estimators of total discards with respect to precision and accuracy.
2. Evaluate impacts of trimming observations (*e.g.* large discard events) on the magnitude of bias and measures of precision.
3. Examine the cumulative method and temporally stratified cumulative method (with various time steps and discarding patterns) and recommend a preferred method with consideration of the following:
  - a. Within-year pattern of precision and bias, including a review of historical data used to estimate landings and discards (precision/accuracy)
  - b. Feasibility/practical aspects, particularly implications of stratum size for small sectors and the ability to derive obtain fine-scale measures of total discard and its uncertainty.
  - c. Estimate the probability of premature closure.
4. Provide guidance of methods to measure uncertainty of the preferred method (*e.g.*, asymptotic vs. bootstrap estimates of variance).
5. Provide guidance on risks of alternative management actions given the uncertainty and/or behavior of the preferred discard estimation method. In particular, consider the costs to industry/sector from premature cessation of fishing and the risk to the resource from excess harvests.
6. Consider implications of finer-scale stratification on performance of estimators that might be required for sector-specific discard rates and will be required for multi-stock species.